

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No.

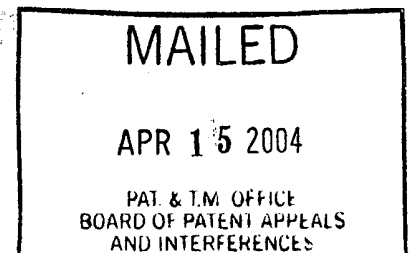
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRIAN CHRISTOPHER HART,
SHAUNA MARIE LEIS,
and
GARY RAYMOND WILLIAMS

Appeal No. 2004-0798
Application No. 09/929,849

ON BRIEF



Before OWENS, TIMM, and DELMENDO, Administrative Patent Judges.
DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 (2003) from the examiner's rejection of claims 2 through 7 and 13 through 20, which are all the claims pending in the above-identified application.¹

¹ The 37 CFR § 1.116 (2003) (effective Feb. 5, 2001) amendment has not been clerically entered. Upon receipt of this

The subject matter on appeal relates to a method for forming one or more slots in a silicon wafer (claims 7-7 and 13-19) and to a method for making ink jet printheads from a silicon wafer having a device surface side and one or more ink feed vias grit blasted therein for ink feed to the device surface side thereof (claim 20). Further details of this appealed subject matter are recited in representative claims 19 and 20, the only independent claims on appeal, reproduced below:

19. In a method for forming one or more slots in a silicon wafer containing a first surface and a second surface opposite the first surface, the improvement comprising the steps of:

forming a substantially permanent non-water soluble first layer on the first surface of the wafer from a material selected from the group consisting of silane materials, photoresist materials, and a combination of silane and photoresist materials;

applying a water-soluble protective material to the first layer to form a protective second layer thereon;

forming one or more slots in the silicon wafer extending through the wafer from the first surface to the second surface thereof; and

removing the water-soluble second layer from the wafer.

20. In a method for making ink jet printheads from a silicon wafer having a device surface side and one or more ink feed vias grit blasted therein for ink feed to the device surface side thereof, the ink jet printheads including nozzle plates attached to the device surface side of the wafer, providing nozzle plate/chip assemblies, and TAB circuits or flexible

application, the examiner should attend to its proper processing and entry.

circuits electrically connected to the nozzle plate/chip assemblies, the improvement comprising:

spin coating a substantially water-insoluble first material on a the [sic] device surface side of a silicon wafer to form a first layer thereon, the first material being selected from the group consisting of a silane material, a photoresist material, and a combination of silane material and photoresist material;

spin coating onto the first layer a substantially water-soluble protective material to provide a second layer on the first surface of the wafer;

grit blasting one or more ink vias in the wafer extending from a second surface thereof to the device surface side of the wafer; and

removing substantially all of the second layer from the wafer.

The examiner relies on the following prior art references as evidence of unpatentability:

Green et al. (Green)	4,009,113	Feb. 22, 1977
Brewer et al. (Brewer)	4,950,583	Aug. 21, 1990
Verley et al. (Verley)	5,105,588	Apr. 21, 1992
Wachi et al. (Wachi)	5,286,703	Feb. 15, 1994
Rogers et al. (Rogers)	5,454,928	Oct. 03, 1995
Kamiyama et al. (Kamiyama)	5,677,063	Oct. 14, 1997
Anderson et al. (Anderson)	5,719,605	Feb. 17, 1998
Murthy et al. (Murthy)	6,045,214	Apr. 04, 2000

Rosen DE 41 23 900 A 1 Jan. 21, 1993
(published German application)

The appealed claims stand rejected under 35 U.S.C. § 103(a)
as follows:

- I. claims 6 and 19 as unpatentable over Rogers in view of Verley and Murthy (examiner's answer mailed Jul. 16, 2003, paper 12, pages 3-4);
- II. claim 4 as unpatentable over Rogers in view of Verley and Murthy, and further in view of Brewer (id. at pages 4-5);
- III. claims 2, 3, 5, and 7 as unpatentable over Rogers in view of Verley and Murthy, and further in view of Green, Wachi, and Rosen (id. at page 5);
- IV. claims 13, 17, 18, and 20 as unpatentable over Rogers in view of Verley and Murthy, and further in view of Kamiyama and Anderson (id. at pages 6-7); and
- V. claims 14 through 16 as unpatentable over Rogers in view of Verley, Murthy, and Kamiyama, and further in view of Green, Wachi, and Rosen (id. at pages 7-8).

We reverse all five rejections for essentially those reasons set forth in the appeal brief filed Jun. 30, 2003 and reply brief filed Sep. 8, 2003. We add the following comments for emphasis.

It is important to emphasize that the initial burden of establishing a prima facie case of obviousness rests on the examiner. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

To support the rejections, the examiner relies primarily on a combination of three references, namely Rogers as a principal reference and Verley and Murthy as teaching references to fill the gaps between the claimed invention and Rogers. Rogers describes a process for forming solid vias or electrical connections from the top plane of a substrate to the bottom plane of the substrate. (Column 1, lines 6-8.) Specifically, Rogers teaches a process including the steps of: coating the substrate with a water soluble polymer to protect the surface from debris generated during a subsequent laser drilling step; focusing a carbon dioxide laser operated at 30 watts on a 50 micron spot to perforate a location on which a via is to be centered; drilling a circular pattern around the perforation to create holes 26 of desired diameter; removing the polymer coating along with the debris generated by the laser; scraping away any residual alumina remaining at the perimeter of each hole; metallizing both sides of the substrate by sputtering a seed layer 27 in order to achieve continuous metallization inside the hole; masking the top and bottom surfaces with dry

film or liquid photoresist materials, leaving only the holes and their upper and lower peripheries exposed; plating gold into the holes; etching the resist film and metal layer; and raising the temperature above the melting point of gold to reconfigure the gold. (Column 2, line 31 to column 3, line 25; Figures 1 and 2A to 2H.)

The examiner admits that the method described in Rogers differs from the invention recited in appealed claim 19 in that a substantially permanent non-water soluble first layer of a material selected from the group consisting of silane materials, photoresist materials, and a combination of silane and photoresist materials is not formed on a first surface of the wafer before a water-soluble protective material is formed on the first layer. (Answer, page 3.) This difference notwithstanding, the examiner alleges (id. at page 4) that Murthy teaches "that it is known in the art of making ink-jet printheads to coat the semiconductor substrate (12) with photo-curable epoxy resin" and that "[i]t would have been obvious to one of ordinary skill in the art [] to use the conventional photoresist layer [] as shown by Murthy." According to the examiner (id.), "[o]ne of ordinary skill in the art would have been motivated to use the photoresist layer [] in order to enhance adhesion between the nozzle plate and substrate..."

The examiner's position is not well taken. Unlike Rogers, Murthy teaches a process for making a polymeric nozzle plate for an ink jet printer. (Column 2, lines 19-32.) Realizing that Murthy's process relates to the formation of a nozzle plate and not a wafer (answer, page 9), the examiner falls back on Murthy's disclosure at column 4, lines 1-5 (id. at page 4). As argued by the appellants (reply brief, pages 2-3), however, Murthy merely teaches photopatterning the photocurable epoxy resin to form ink supply channels in the substrate of an ink jet printhead. Thus, the appellants are correct in asserting that there is no motivation to combine Murthy with Rogers. While Murthy does teach that a thin layer of photocurable epoxy resin enhances the adhesion between the nozzle plate and the substrate in an ink jet printhead, the examiner does not explain why this teaching is relevant to the types of methods described in Rogers, i.e. why the teaching would have led one of ordinary skill in the art to modify Rogers's method of forming conductive vias on a substrate.

Because all five rejections are based on the same problematic combination of Murthy and Rogers and none of the other references cures this basic deficiency, we cannot affirm any of the rejections.

For these reasons, we reverse the examiner's rejections under 35 U.S.C. § 103(a) of: (i) claims 6 and 19 as unpatentable over Rogers in view of Verley and Murthy; (ii) claim 4 as unpatentable over Rogers in view of Verley and Murthy, and further in view of Brewer; (iii) claims 2, 3, 5, and 7 as unpatentable over Rogers in view of Verley and Murthy, and further in view of Green, Wachi, and Rosen; (iv) claims 13, 17, 18, and 20 as unpatentable over Rogers in view of Verley and Murthy, and further in view of Kamiyama and Anderson; and (v) claims 14 through 16 as unpatentable over Rogers in view of Verley, Murthy, and Kamiyama, and further in view of Green, Wachi, and Rosen.

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LEXMARK INTERNATIONAL INC
INTELLECTUAL PROPERTY LAW DEPARTMENT
740 WEST NEW CIRCLE RD BLDG. 082-1
LEXINGTON KY 40550-0999